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**Vehicle damage to vegetation of the Rangipo Desert,  
Tongariro National Park, New Zealand**

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## Abstract

Rangipo Desert, Tongariro National Park, Central North Island, New Zealand, contains one of New Zealand's unique habitats due to the desert-like environment containing cushions, low lying species, and native grasses which create a diverse mosaic of plant species and colour. This area is under anthropogenic threat from drivers operating vehicles over the vegetation. My aim was to investigate the damage to vegetation and substrates which have been driven over by vehicles.

Aerial images were used to draw information about the Desert's ecosystem, and driver's manoeuvring preferences which were ground-truthed. A Canonical Correspondence Analysis was used to evaluate the accuracy of categories from the aerials after ground-truthing. A Paired t test was used to show varying vegetation densities against other tested variables. A Chi Square Analysis was used to examine where drivers preferred to drive. The results indicate drivers prefer to drive over bare substrate and sparsely vegetated areas within the desert, avoiding dense vegetation, deeply cut channels and rough, un-driveable terrain.

The direct damage done by vehicles to vegetation and surrounding substrate was tested by running a simulated tyre over the substrate and plants. A plant having had a tyre pushed over it by hand was compared to a plant that had been previously damaged by vehicles, and a control (undamaged) plant. Analysis of Variance was used to test differences in the growth of the plants within each treatment and the change in topography. There is evidence of plant damage; however, different species reacted differently to treatments, depending on which variable was being tested, making it difficult to identify which species are most affected by vehicle damage.

The tyres alter the substrate instantly. Intact and broken substrates were compared by creating wind and rain with a leaf blower and watering can. The change in substrate height was measured and Analysis of Variance was used to test the amount of substrate erosion. Results show broken substrates are eroded at a greater rate than intact substrates, and the erosion rate is increased when the substrate is dry. Wet, sandy substrates in windy conditions and wet, pumice substrates in rain have the lowest amount of substrate movement after damage.

The Rangipo Desert's dry and open ecosystem and vegetation is vulnerable to damage from vehicles. Vehicles cause plant die-back, increase erosion and have the potential to change the current ecosystem. Preventing vehicles driving into the Desert, and educating members of the public about ecosystem damage are good starting points to manage and preserve this area of Tongariro National Park.

**KEYWORDS** Arid ecosystems, vehicle damage, erosion, plant changes, micro-topography.

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*Dedicated to  
My grandson Raymond  
May there still be some healthy earth for your Grandchildren!*

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